

How to Grow Alfalfa and Other Legumes



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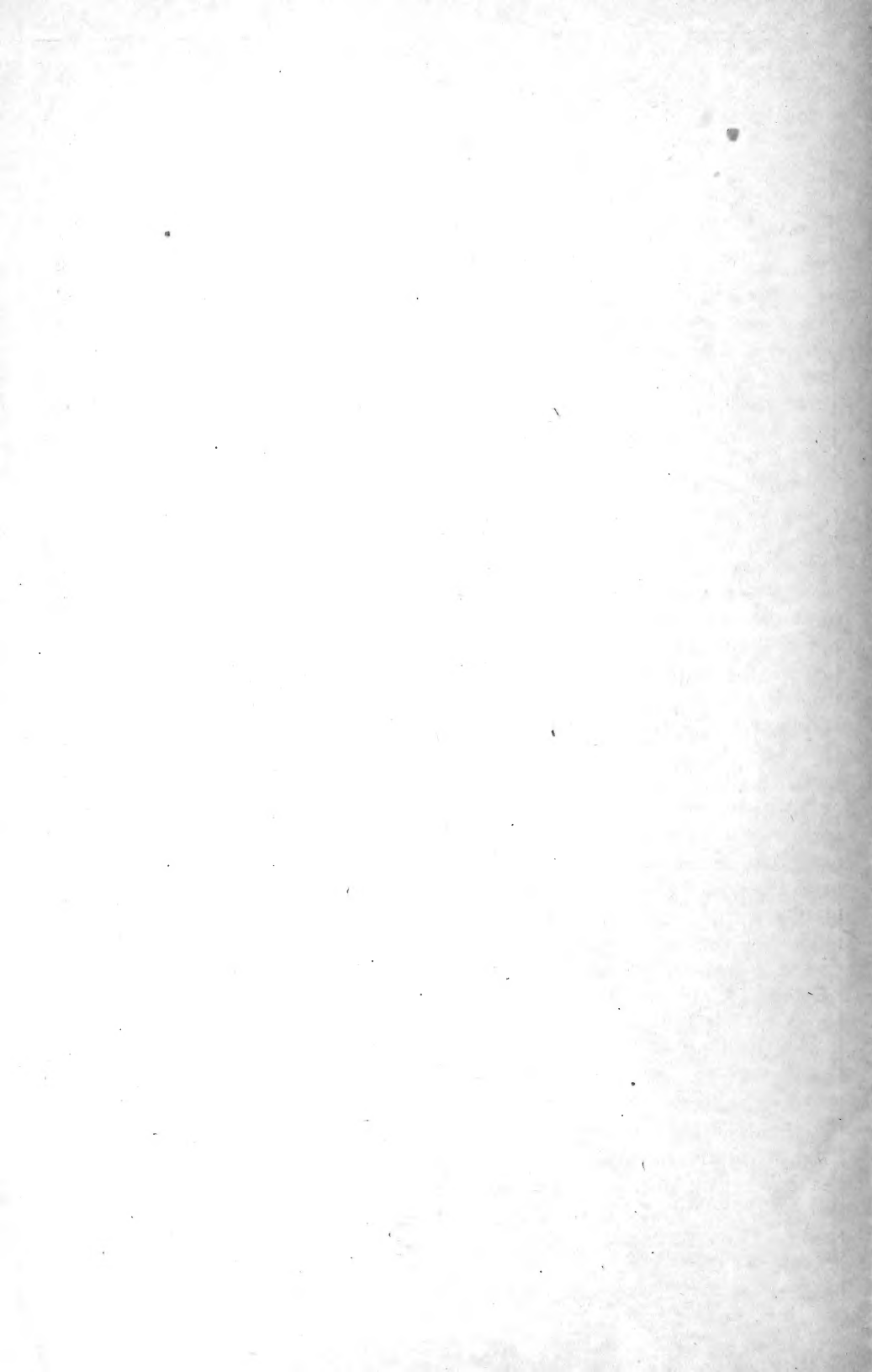
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INTRODUCTION

Few people realize the great importance of the class of plants known as "Legumes". Everybody knows, of course, that the principal elements of soil fertility are nitrogen, phosphorus, and potash. Most of us have a more or less vague notion that all of these elements were formed originally by the decomposition of rock. It is true that phosphorus and potash were formed in this way, but the earth's store of nitrogen comes almost altogether from deposits placed there by leguminous plants.

Nitrogen is one of the very greatest essentials in crop production. To purchase it would cost today fully twenty cents for a sufficient quantity to produce a bushel of corn. None of us could afford to do this to any considerable extent. The legumes, however, draw this nitrogen from the air and give it to us without charge. I think this actually makes the legume crop the most important in the world. Without them, prices would either soar to such prohibitive levels that the poor would necessarily starve, or else the farmers would be forced into such poverty that slavery itself would be easy in comparison. Without them, the cost of production of the rest of our crops would easily be doubled. With them, by judicious farming, we live in prosperity, and are even able to increase the soil's store of nitrogen, thereby increasing our other crops to a point far beyond the limit when the virgin sod was broken.

I mention the fertilizing elements of the legumes because I think that few people realize the extreme importance of this fact, but it is by no means the only good quality found in them, for without doubt they are incomparably better feed than the majority of the non-leguminous plants.



ALFALFA

Our first experience with this plant in Ohio was about twenty-five years ago. Our Mr. Joseph E. Wing, while working in Utah, became convinced of the value of the plant and sent a little seed home. We sowed, probably, a tenth of an acre, and for a wonder we sowed it on soil that was practically ideal; strong in limestone, a heavy, fertile, red clay, about six feet deep, underlaid with sand and perfectly drained. Sweet clover has always grown naturally around our farm, so that the necessary bacteria for inoculating were already present. My father thought little of the plant, because while it stayed green, it seemed to make little growth. One day Joe, when looking at the patch, noticed the chickens eating the leaves, and deciding that this might have something to do with the plants' slow growth, he covered a few plants up with an empty barrel, the heads of which had been knocked out. A few weeks later the Alfalfa climbed out of the top of this barrel, and the mystery of its small growth was explained. I remember distinctly that I was raising a few calves at the time, and they were also running in the lot where this Alfalfa patch was. Joe insisted on fencing it to keep the calves and chickens away. We did this, and the doleful bawls of the calves, continuing for many days after, gave us still another reason for its apparent slow growth. Within a year or two after putting out this patch, we sowed perhaps a half acre in a corner of a field where neither chickens or calves could molest it. This patch also did first rate. We then gathered enough courage to sow three or four acres. This seeding was on a field, part of which was well-drained and part was not; part of it had received barnyard manure and part had not. The drained part which had received no manure did about half as well, and the undrained part also did very poorly. So here we learned our first lesson of the "don't's" about Alfalfa, and we began laying tile wherever needed, and applying manure where none had been recently applied before, getting one field after another ready for Alfalfa. This was in the early '90's. My father died in 1891, at the beginning of the hardest times any of us can remember. He had money loaned out at interest, and for a matter of at least five years, it is my opinion that we could not have lived off of the income of our two hundred acre farm, had it not been for the interest on these outstanding notes. It was quite early in the '90's—about '91 or '92—that we thought we had our first twenty-acre field ready to receive Alfalfa. Times were mighty hard, and I remember telling our mother, after this twenty-acre field was seeded and it came on looking well, that while it was pretty hard to live off of the income of the

farm, I felt that the Alfalfa was going to help some, and that after a little we might not be quite so poor. In those days we had very little manure. The farm was in considerably better condition than when my father bought it about forty years ago, but even so, it would support only perhaps fifteen head of fattening cattle, half a dozen horses, and four or five milk cows; thus, we were unable to cover large areas with manure.

Our timothy and clover meadows produced as well as those of our neighbors, our alfalfa meadows were fair, but the only thing about either one that we could brag on was the beautiful quality of the alfalfa hay. About 1893 we built our first hay-barn, a barn 40x60, 20 ft. to the square, holding somewhat over one hundred tons of hay, and under



A Good Plant of Common Alfalfa From Our Trial Grounds

it we could keep our milk cows and between three and four hundred head of lambs. The neighbors made all manner of fun of this big mow, assuring us that we never would fill it. It did take several years before we grew enough in one season to fill the mow, but how well we finally succeeded will be shown later.

It is my recollection that about the time the first twenty-acre field came into bearing, we began to feed a few head of lambs. We were ditch-

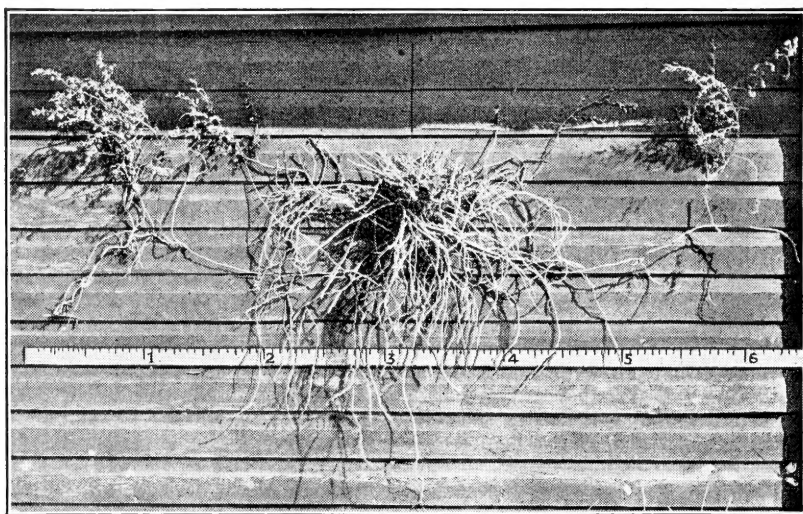
ing each year and returning all of our crops to the soil in the form of manure. Our manure was very carefully saved and properly applied. It was not long until we were able to prepare and seed twenty acres of Alfalfa each year, and after the first twenty acres became established, the amount of hay that we produced each year increased rapidly. Having more hay enabled us to feed more lambs. From two or three hundred we increased perhaps to four hundred, five hundred, then to seven hundred, to one thousand, and by this time we were not only filling this mow with Alfalfa hay, but we had the horse barn full, and one or two small barns; then we bought twenty acres of land; then thirty acres more; then sixty acres; built more barns, and so on to the present time. Today, the three brothers of us who started together, harvest Alfalfa hay on never less than two hundred acres. We feed fifteen hundred lambs, perhaps an average of fifty cattle, mostly dairy cows, keep perhaps fifty horses, and usually a few other things besides.

As already stated, the first "don't" that we ever ran across was that of drainage. Since that time we have abundantly demonstrated the fact that Alfalfa must have at least three feet of perfectly drained soil, or else it will die about as soon as its roots penetrate the water-logged soil beneath. There are, besides drainage, five other important things to consider when sowing Alfalfa. These are **lime, inoculation, seed, method of seeding, and fertilizers**. We will consider each of these in turn.

LIME

On Woodland Farm it has never been necessary to apply lime, but many years ago we found that most portions of the Corn-Belt, or in fact, of the eastern half of the United States, must use lime before they could possibly succeed in growing Alfalfa. Our discovery of this principle has doubtless more than doubled the acreage that is now growing this plant. Every State east of the Missouri River will be found lacking in lime in certain of its counties. The entire eastern half of Ohio must have lime before Alfalfa will succeed. The southern half of Indiana, part of southern Illinois, and in fact portions of all these states east of the Missouri River will be found to absolutely require the application of lime. Alfalfa is a greedy feeder on lime, and if you sell live-stock fed off of the hay, you are greatly depleting your soil of its lime. Years ago the Pennsylvania Experiment Station began long-time tests on the use of lime in several of its different forms. They found, in many years' trials, that caustic or fresh-burned lime attacked the humus of the soil and actually ate up seven dollars' worth of this humus each year. By far the best form of lime to apply is ground limestone rock. This should be pulverized so that the coarsest of it is about the size of the head of a pin. However, sometimes one can buy refuse from the quarries, one-half of which will run as fine as this, the other half being coarser. Sometimes this sells for only twenty-five cents

a ton at the quarry, and its application when used heavy enough is all right. We would use from four to eight tons per acre of this coarse limestone, or from two to four tons per acre of ground limestone rock. The ground limestone is Nature's own way of applying lime. It does not attack the humus at all, may be applied while the crop is growing, or at any time that is convenient to you, and its effect is beneficial in every manner. If you cannot obtain ground limestone at a cost of five dollars per ton, delivered at your station, then buy the fresh, burned lime, put it in a dry place and let it air-slack for at least six months before applying. When thoroughly air-slacked this lime is exactly the same chemical as ground limestone rock. Hydrated lime is better than the fresh burned, but is not, in our opinion, as satisfactory as either ground limestone rock or thoroughly air-slacked lime. There is just one proper way to apply these dif-



A Plant of Orenberg Alfalfa, Showing Root Development

(The measure shown above is in feet.)

ferent forms of lime; that is, by the use of the Buckeye Broadcast Lime and Fertilizer Sower, made by The American Seeding-Machine Company, Springfield, Ohio. We use these distributors ourselves, not only for lime, but for fertilizers, and we would not know how to get along without them.

INOCULATION

When we began growing Alfalfa no one had written anything about inoculation, and no farmer knew anything at all about it. It was fortunate that our own farm did not require this, because we would probably have failed if it had. Woodland Farm itself has never required any inoculation whatever. Other farms which we have bought since we began growing

Alfalfa have required it, and the plants would have failed absolutely without the inoculation. Nowadays, most of you already know that all leguminous plants have little bacteria which work on their roots, drawing nitrogen from the air, giving part of this to the plant itself and leaving part to decay in the soil. These bacteria, in almost every case, are different with different plants. A different species works on Alfalfa from the one that works on Medium Clover; still another one works on Soy Beans; another one on the Vetches, etc.; also, it is almost a universal rule that these bacteria perish in sour ground. This probably explains the reason why Alfalfa will not grow on sour ground. It cannot live long without its bacteria, and its bacteria cannot survive an acid soil. Furthermore, the bacteria thrive on soil that is well-drained and that is porous to a considerable depth. This also helps explain why drainage and deep plowing are useful when growing not only Alfalfa but other legumes.

Finally, the bacteria all thrive better on soil containing a large amount of humus. Notice how nicely this entire matter dovetails in with the already well-known principles of good farming. Lime sweetens the soil, preparing it as a proper home for the bacteria; drainage aerates the soil and again benefits the bacteria; deep plowing does likewise, and the conservation or application of any form of humus again benefits these bacteria. The cumulative effect is very great.

There are two forms of inoculation: Soil from the fields which are already successfully growing the legume which we wish to inoculate, and the artificial cultures. The bacteria of Sweet Clover is the same as Alfalfa; therefore you can inoculate Alfalfa with the soil from around sweet clover plants, or vice versa. To use the soil, take only from the top six inches of the ground, and get it from around plants whose roots show nodules. Dry this soil carefully away from the sun or from much artificial heat. It can then be applied through the fertilizer box of a good fertilizer drill (the Superior handles it very nicely), and this is our favorite method of use. For Alfalfa we like about one hundred pounds of soil per acre as inoculation. If seeded through the fertilizer attachment, it can be done at almost any time. If broadcasted and harrowed in, it must be done in the evening or on a cloudy day, and must be harrowed in immediately, because sun kills the bacteria. The artificial cultures are now becoming quite reliable. They cost about two dollars an acre, directions accompanying the material, and in some cases the cost would be no greater than would the application of soil. Ordinarily, the seed itself is inoculated with the artificial cultures and then, of course, it must be immediately covered when seeded, not allowing the sun to kill the bacteria.

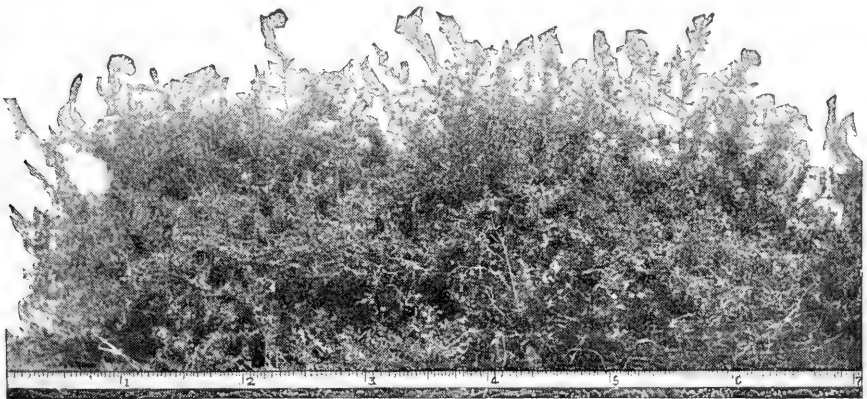
SEED

During the past twenty-five years, since we began growing Alfalfa, we have, of necessity, made a very careful study of its seed. We began

by using either European seed or Utah seed. Since then we have used seed from each of the Western states; have tried the Turkestan, and now have in our trial grounds, even the great new Siberian varieties brought over by Professor Hansen. I do not think it necessary at this time to say much about the necessity of using pure seed. Every farmer realizes this himself. A few beginners may not know the importance of having seed that is free from dodder. This weed is so dangerous that in many cases a meadow infested with it must be immediately plowed up and farmed in Corn a few years in order to eradicate the weed. After studying different lots of seed as grown in our own meadows as well as in our trial grounds, we, in common with other growers and experimenters, have come to place the value of the seed somewhat on a basis of its hardiness. Thus, we have entirely discontinued using Kansas seed because it was not quite hardy enough to suit us, even in central Ohio. For the same reason we have discontinued using Utah seed. We abandoned European seed partly for this reason and partly on account of its weeds. After testing a great many lots we have settled mostly on Nebraska seed for sections which require only a moderate degree of hardiness; on Dakota or Montana seed for sections that have rigorous climate; on the Grimm and Siberian varieties for the most extreme conditions. The Nebraska seed shows greater hardiness with us than Kansas seed. It is usually free of weeds and shows excellent germination. Dakota-grown seed taken from meadows only four or five years old is hardier than Kansas seed, but, of course, not as hardy as when taken from older meadows. The hardest seed grown in the United States today comes from meadows about thirty years old, some of which can be found both in Dakota and in Montana. These plants have withstood temperature of thirty to forty below zero, frequently without any covering of snow on the ground; they have withstood Chinook winds, drouth, and quite fervent heat in summer. These conditions lasting for twenty-five or thirty years have eliminated the weaker strains and left decidedly hardy plants, whose seed partakes strongly of the parent plants' vigor. Finally, we believe these old meadows are patterning somewhat after the Grimm, and it may be that the Grimm Alfalfa was produced under similar conditions. The crowns are now becoming a little submerged. With the Grimm the crowns are an inch or so under ground; with these old meadows, probably not that deep, but with a constant tendency toward submergence. As already stated we consider the Grimm the variety adapted to the most rigorous conditions. It has been subjected to similar conditions for probably over one hundred years. The result is a variety having branching roots instead of almost exclusively one large tap root, its crown one or two inches underground, well protected from all untoward events. From this crown it sends up a large number of shoots, making a heavy yield and, in our opinion, spreading out in this way so that a smaller amount of seed can be used than would be advisable with other varieties.

The Siberian Alfalfas all have the same characteristics as the Grimm. Their crowns are some inches underground; their roots spread out as its

roots do; they are in all cases as hardy as the Grimm, and in the case of the Orenberg, probably considerably hardier. We see little difference between some varieties of the Siberian and the Grimm; not enough to warrant our taking your time in this booklet to describe them. But one variety, the Orenberg, impresses us so favorably that we think it warrants everyone's attention. This plant is at present growing, as far as we know, only in certain trial grounds in Dakota and in our own trial grounds here. Its seed is extremely rare and almost unobtainable. The plant, at first glance, presents a remarkable appearance. Its crown proper is two inches underground, as with the Grimm. At the surface of the ground its crown is fifteen to eighteen inches in diameter. From this it sends up, at a guess, five hundred stalks; in fact, we think it easy to find many plants with this number. The stalks are decidedly fine and leafy, more so than with ordinary Alfalfa. At present no one knows whether it will make one, two



Two Plants of Orenberg Alfalfa

(The measure above shows feet.)

or three crops in the Corn Belt. The growers at present are saving seed entirely. They have thought, in the Corn Belt, it will make two cuttings instead of three, and if this is true, its yield of hay will probably not be lower than that of ordinary Alfalfa. This variety has practically no tap root. Just below the crown the roots sprangle out in all directions. Part go pretty straight into the ground, part at a depth of about eight inches run laterally, and from time to time send up new plants. We have never seen any other species of Alfalfa that would do this. This variety should stand hardpan conditions or poorly drained soil where plants are inclined to heave out in the spring, better than any other variety we have ever seen. Furthermore, apparently, it is the hardiest variety in the world, as we recently saw a letter from an experimenter in Alaska, right in the edge of the Arctic Circle, who had succeeded in growing the Orenberg when even the Grimm had winter-killed.

METHOD OF SEEDING

There are, at present, several methods used for seeding Alfalfa. The newest, and in our opinion, the most hazardous one, is the method which is being recommended just at present by a few men who seem to have succeeded all right, but whose experience is not wide enough to be conclusive. This method is simply sowing on top the ground when the ground is honeycombed in the spring. Its advantages, if successful, are obvious, but some of our correspondents advise absolute failure, and with trials of our own the method has failed.

The second method that is better is that of seeding in Wheat in the spring. This is not such a bad way, but our suggestion is that instead of sowing on top the ground when the soil is honeycombed, as some wish to do, you use the Superior Alfalfa drill, manufactured by The American Seeding-Machine Company. Take this into your field as early in April as the ground will do to work and sow your seed with it. The disadvantage of this method is that the Wheat gets a start of the Alfalfa, even when the Alfalfa is seeded as early as practical, and throughout the early part of the summer, the Wheat, if it does well, will shade the Alfalfa rather too much. However, we have seen good results by this method, and where you particularly desire to do this way, we would hesitate about actually discouraging any one from using this method. We would consider it more risky to use this method with Rye, unless the Rye were either pastured or were seeded very thinly on the ground. Also, if we were seeding any Rye, we would harrow it before using the drill. Harrowing seems not to injure the Rye crop, and it should hold the plants back a little, preventing their making the rank, early growth that shades the Alfalfa too much.

The third method that is still questionable in our minds is that of sowing in Corn at the last cultivation. We have seen this succeed nicely and we have seen it almost absolutely fail. The Corn shades the ground too much, takes out too much moisture and does not come off early enough in the fall to give the Alfalfa a start before winter.

There are two most important methods; one is to seed with a nurse crop the first half of April if possible; the other is to plow the ground early, keep it fitted throughout the summer in order to destroy the weeds, and to sow from July first to August fifteenth without a nurse crop. There are very ardent advocates of each method. For ourselves, we practically always use the former, using beardless barley as a nurse. Our reasons for this are that in April moisture conditions are satisfactory, we get prompt germination, and the Alfalfa has time to become thoroughly established before winter. Our objection to summer seeding is that the Alfalfa may be seeded right during a drouth, germination may be less satisfactory, moisture conditions after seeding are likely to be less satisfactory than after the spring seeding, and the plants are likely not to

become as well established before winter as they should be. When seeding in the early spring it is necessary to use a nurse crop, the best one of which is Beardless Barley. We use one bushel of Barley per acre. The next best thing for a nurse crop is probably 60-Day Oats, seeded only one bushel per acre. Next to that we would place Winter Rye which, seeded in the spring, will not head out, but grows a foot high and dies.

There is a little difference of opinion about the amount of Alfalfa seed to sow per acre. This depends first upon the quality of your seed, second upon your seed bed, third upon the form of machinery that you are using for seeding, and fourth upon whether the field has been growing Alfalfa before or not. It is no economy to use cheap, inferior seed; the best is cheapest in the long run. The better your seed bed the less seed you need; the better implements you have for seeding the less seed you require. Under ordinary conditions where Alfalfa has not been grown before, and using ordinary seeding methods, twenty pounds of seed per acre is not too much; under ordinary conditions on ground which has grown good Alfalfa before, fifteen pounds will give good results. There is no longer very much difference of opinion as to the very best way to sow. We use an ordinary grain drill for sowing the grain, and the Alfalfa drill made by The American Seeding-Machine Company, Springfield, Ohio, for sowing the Alfalfa. When using this Alfalfa drill, we figure that it is safe to cut down the amount of seed used by about twenty-five per cent; that is, use twenty-five per cent less seed than we would for sowing with any other machine.

Always have your ground thoroughly prepared before you undertake to sow Alfalfa. Apply the seed as uniformly as possible, covering it not more than one inch deep. We prefer plowed ground that has been pretty well firmed, this firming helping to prevent deep seeding.

FERTILIZERS

It is, in our opinion, of the very greatest importance when sowing Alfalfa, to apply fertilizer. We discovered this principle many years ago, and even on our most fertile ground we still continue to apply commercial fertilizers regularly. Alfalfa will supply its own nitrogen. Muck soils must receive potash. Doubtless sandy soils, also need this. All soils must receive phosphoric acid, and this, we think, should be used in the form of either basic slag or bone meal. Basic slag is a bi-product of steel manufacture where lime is used as a flux, uniting with phosphoric acid in the ore. The resulting compound is finely ground. The best brands run 16 to 19 per cent phosphoric acid, all of which is available when mixed with the soil, and none of which is inclined to revert, as is the case with acid phosphate.

Furthermore, as already stated, any legume crop requires alkaline conditions, not acid. Therefore, it is the wrong principle to apply acid

phosphate with its frequent excess of free sulphuric acid, and it is an absolutely correct principle to apply basic slag, which carries 35 to 50 per cent lime in addition to its phosphoric acid.

A good Alfalfa meadow will use about one hundred twenty-five pounds of basic slag a year. Therefore, when seeding, we are now applying from three to five hundred pounds of basic slag. If three hundred, we repeat the application every other year; if five hundred, we repeat it not oftener than once every third year. Thus, we figure that we are giving the plants all the phosphorus that they consume, and are actually adding a little phosphorous to the ground all the time. This is the principle that we are trying to observe in all our farming; that is, to make the soil a little richer each year. Basic slag can be applied at any time, but it must be mixed with the soil. The Superior fertilizer drill handles it nicely, and it is the most satisfactory fertilizer for Alfalfa, especially for top-dressing the meadows, of any thing that we have ever used, and next to it comes bone meal, which is nearly as good, but carries only minute quantities of lime.

CARE OF A MEADOW AFTER SEEDING

FERTILIZERS

It is vitally necessary that Alfalfa meadows should receive proper treatment after they are once established, and one of the most important items in this connection is proper fertilization. You can no more expect an Alfalfa meadow to continue producing large crops without being fed than you can expect your high-producing dairy cows to do so. What we just said about basic slag applies to the meadows already seeded just as well as to those that you are seeding. Make it a rule to give your meadows one hundred and twenty-five or fifty pounds of this material every year. We would sooner apply at least enough for three years at one application than be doing the work over and over every year, or even on alternate years. On our own meadows we have frequently doubled our crop when top-dressing a meadow that was not particularly thrifty and when using the basic slag.

CUTTING

The Alfalfa plant is peculiar in that it must be cut at exactly the right time, or at least, at practically the right time. If you cut a meadow a week too soon you may very possibly injure its entire life. If you cut it two weeks too soon, you may entirely kill it. The rule which can be most safely applied is to watch for the little shoots which form at the surface of the ground. When these shoots appear the next crop is ready to start, and it is then time to remove the present cutting. If you cut before these shoots appear, you will almost certainly injure the plants, and if cut two weeks before they appear, you will kill very many of them.

It is almost equally serious to wait too long after these shoots do appear. If you let the meadow stand long enough to let these shoots grow two or three inches tall and then mow, clipping off the tops of the shoots, you will certainly injure the plants, and some of them will never recover.

HARROWING

Some people have advocated the disking of Alfalfa meadows. When we first read of this we thought it might be all right ourselves, but careful study of the subject convinces us that disking is all wrong. It mangles and bruises the crowns of the Alfalfa, making them fit subjects for the entrance of fungii and of nearly all disease germs, and we cannot see any material good that is accomplished by this practice. On the other hand, grasses such as Kentucky Blue Grass, Timothy, etc., easily become started in Alfalfa meadows and finally crowd the Alfalfa out. We would remove these grasses by the use of the regular Alfalfa harrows made on the spring tooth principle or with the American Seeding-Machine Company's Special Buckeye Alfalfa Cultivator rather than with any other tool. We would use these harrows immediately after removing the first or second cutting.

LIME

If your soil is very acid and you apply only a moderate amount of lime at time of seeding, it will be necessary to apply additional amounts every other year, or if only mildly acid, perhaps every three or four years. This can best be done by the use of raw ground limestone, applied at your convenience and harrowed into the ground. If you omit this the acidity will gradually get your Alfalfa meadow.



CLOVERS

There is little that I need to say on the general subject of Clovers. All of you know the advantages of the great Medium or Common Red Clover; you all know about Mammoth Clover also; you know that Alsike is the best species when it is necessary to sow on poorly drained soil, or on acid soil, and the southern farmers know perfectly of the great value of Japan and Burr Clover. Therefore on this general subject I am going to tell you only one thing, which some of you do not know. Many of you have had difficulty in securing a stand of Clover, when seeded by ordinary methods, on top the ground in February or March. I think four-fifths of this trouble may be obviated by using the Superior Alfalfa drill, waiting until the ground is in proper condition to work, about the first of April, and seeding with this machine, crossing your wheat rows, putting on either much or little seed, according to your needs, but using this machine because it will cover the seed at about the right depth, and it will not injure the Wheat. As soon as this machine comes to be universally used I expect four-fifths of the farmers, who have been having trouble, to succeed nearly every time.

There is one species of Clover concerning which all of you do not know at present. This is Melilotus or Sweet Clover.

MELILOTUS

Considering the fact that this plant has grown wild along our roadsides ever since any of us can remember, it is remarkable that it assumed no prominence until recently; or, that once started it became popular so rapidly.

As a boy I was taught to despise it as a weed. Finally a few years ago some very well informed men began saying that it made a good fertilizer plant. Others began saying that it made good pasture, and a few ventured the assertion that it made fine hay.

I did not believe the hay would be valuable, but sowed my first field for fertilizing purposes, and my next field for pasture. The field seeded for fertilizer was extremely poor and I made the serious mistake of not inoculating; therefore, my first attempt was only partially successful, many of the plants dying for lack of inoculation. The field I seeded for pasture thrived, and when in its prime I pastured it off with hogs, securing as splendid results as with any pasture that I ever saw. I was so pleased that I seeded another field for the same purpose, and was equally well satisfied with it also. Since that time, which was several years ago, I have grown it regularly.

It happened that I needed more hay than I had one season, and, therefore, saved some of this crop for hay. I found that all of my stock ate the hay nearly as well as they did alfalfa, and since that I have used it regularly as a hay crop. In analysis Sweet Clover does not differ greatly from Alfalfa, in fact the two plants are decidedly close together. In palatability, if properly cured, there is less difference than you would imagine, although the Sweet Clover grows much coarser than the Alfalfa. Stock have to learn to eat this plant, but this does not take long.

As a fertilizer crop *Melilotus Alba*, which we consider the greatest species, is second to no other plant grown at present in the Corn Belt. We consider it entirely possible, when figuring the yield of both tops and roots, to call a crop of this plant 7,500 pounds per acre. A crop of this size would gather 136.5 pounds of nitrogen from the air, this nitrogen being worth \$30.45.

Furthermore, Sweet Clover seeds itself, and worn out fields can thus be seeded down to it, left for three or four years, both tops and roots dying and going into the soil in this time, and after allowing this process to continue for three or four years, if the field is plowed up, the change in it will be found to be wonderful. We have known ground so poor that it was impossible to grow a profitable crop of any kind, to be reclaimed by this method until it regularly grew profitable crops.

As a hay crop we do not look to see *Melilotus* replace Alfalfa to any great extent. It will grow on ground decidedly too poor for Alfalfa, otherwise Alfalfa conditions suit it pretty well. It requires lime just as much as Alfalfa does, also needs inoculation, and it likes phosphorus. It is my opinion that it will be used somewhat as a preparation for Alfalfa, and after getting conditions right to grow *Melilotus* in large crops, farmers will decide that it is now time to go a step farther and grow Alfalfa.

Also, I see no reason why *Melilotus* should not to a considerable extent replace Medium Clover. It is a biennial as the Medium Clover^{*} is, therefore fits into a short rotation better than alfalfa. It is decidedly superior, in my opinion, to Medium Clover as a hay crop, will grow on ground too poor to produce satisfactory Clover, and, in my opinion is no more difficult to grow.

The most important essentials in producing a satisfactory crop of *Melilotus* are as follows: lime, phosphorus, proper seed-bed, proper seed, inoculation, and drainage.

Taking these points in detail, it is idle to sow Sweet Clover on acid ground, or ground that is lacking in lime. It loves limestone, and requires it fully as much as alfalfa itself.

The matter of seed-bed is important. We have succeeded admirably in sowing Sweet Clover late in the fall on top the ground without any covering. We have also succeeded by the same method when sowing throughout the winter and spring. We have succeeded when sowing at any time during the spring and summer when our seed-bed was not too loose, but if the surface soil was very well prepared, and we covered the seed too deeply we have seriously injured our stand. We now aim to cover just as shallow as possible, and this is the proper manner.

The use of proper seed is decidedly necessary. Unhulled seed gave us such poor results that we absolutely discontinued using it. Hulled seed should show a germination of not less than 85 per cent, and we frequently have it go over 95 per cent. Be very careful that you are getting good, viable seed.

Phosphorus we consider of great importance, and probably as important with this crop as with any other. Inoculation we find to be as necessary with Sweet Clover as it is with Alfalfa. Drainage is as important with it as it is with Medium or common Clover.

The harvesting of Sweet Clover hay looks to be quite difficult; actually it is not such a hard proposition. When the plants begin to blossom we take a self-rake, mowing it then about a foot high. If you cut close at this time you will absolutely kill the plants. We drop moderate-sized bunches in a place, let them lay two or three days, then place in moderate-sized shocks. It is necessary for it to lay in the shocks for two or three weeks, after which time it may safely be put into the mow. Handled in this way all the leaves are saved, the plants will not burn, nor will they heat unduly; and they will come out in very palatable form.

Harvesting the seed crop is just a trifle difficult. The seed crop is, of course, the last crop which the plant produces. The first season, if you sow early in the spring, you get a fair amount of pasture. The second season you will cut a good hay crop in June. By cutting the plants a foot high you will not kill many of them, and they will come on and make a seed crop. I use the self-rake always for cutting this crop, and the work must be done at the right time, and in the proper manner. Start cutting when three-fourths of the seed pods are turned a trifle brown; work only

when the dew is on the plants. In order to accomplish this I work either at night or extremely early in the morning, and stop work just as soon as the dew has dried off. Drop the bunches with the machine just medium in size. If this is done you will not need to touch them at all until it is time to thresh. They will need to cure out not less than two weeks, and possibly three or four weeks before you should begin threshing; a few rains in the meantime will benefit them. Just before you are ready to thresh, if the bunches seem damp, open them out very carefully, doing this work in the night or very early in the morning.

When threshing use the Birdsell Clover Huller, and tight bottom wagon beds or sleds to haul on; use plenty of canvasses around the threshing machine to catch shattered seed, and occasionally clear your sleds or wagon-beds of accumulated seed which has shattered off on to them. Have your men handle the crop as if it were eggs, even when hauling in to the threshing machine. Properly handled, the seed crop is excellent, and six or seven bushels per acre can be secured.



SOY BEANS

I am glad to see this crop assuming the importance it deserves. I began growing it fifteen years ago, considering it a really useful plant even at that time when we were compelled to use stocks which were by no means as good as we have today. For years I urged farmers to grow it, and now it does not seem to require much urging to get anybody interested.

The point which attracted me to it in the beginning was the very high per cent of protein contained in the grain. This actually runs about 35 per cent, wheat bran is only 15.8, linseed oil meal 32.9, thus the Beans are actually quite a little richer than oil meal itself. Furthermore the fat content in the Beans is extremely high, 20.3 per cent, while for comparison Corn is only about 5 per cent. When I first began growing them I thought from their chemical analysis that they should be twice as valuable, pound for pound, as Corn, and I would place them in about this proportion today.



In the Soy Beans Test Plots

This plant is remarkably useful in several different ways. Its grain, as already stated, is very nutritious; furthermore it is greedily eaten by all kind of stock, and is not difficult to digest. I consider it the most fattening grain that I have ever tested. In addition, the plant when cut for hay analyzes about as high in protein as Alfalfa itself. I do not consider it equal to Alfalfa because it is coarser, but I do think it fully equal to any of the other clovers. In addition it is one of the very greatest fertilizing crops we have. We estimate that for plowing under it would not be very difficult to secure a yield, including the weight of roots, of 5250 pounds per acre. This yield would gather 300 pounds of nitrogen per acre from the air; this nitrogen being worth about \$18.00, while the cost of the seed should not be more than \$1.00 per acre, and usually not that. Furthermore the threshed straw is of decided value, worth, in our opinion, nearly as much as clover hay. And finally the plant does well on poor ground, much better than our ordinary farm crops.

It is being used today in a variety of ways. Some farmers thresh the grain and feed it to all manner of live stock, the threshed straw being used in exactly the same way as you would clover hay; other farmers "hog off" small acreages in connection with Corn; still others are cutting it for hay or making it into ensilage, while many are plowing it under in order to take advantage of the great store of nitrogen contained in the plant.

One of the uses to which it is being put is in orcharding. Some of the orchardists wish to cultivate their trees all summer, and lay by with a cover crop in the winter. Many of these men are sowing Soy Beans, cultivating all summer, sowing Rye and Winter Vetch at the last cultivation, either removing the Beans for grain, or allowing them to stand for fertilizer. Then in the spring following, plowing under the Vetch and Rye, and planting Soy Beans again. These men are careful, shrewd, scientific farmers; many of them soil experts, and they would not pursue this policy and be as enthusiastic over it as they are if it were not successful.

Some men are sowing the Beans in their Corn, either "hogging the fields off," or cutting both crops together to go into the silo. Some of these men are decidedly enthusiastic, although we have always felt that it was doing the Bean an injustice to shade it as much as this method does, and we have always felt that it would be wiser to grow the Corn by itself and the Beans by themselves.

Its usefulness as an ensilage crop is undoubted. We have had fields of Beans produce fully ten tons of ensilage per acre, and that is as much as we ever count on with Corn. In making ensilage, however, we advise always using as much as three parts Corn to one of Beans. It keeps better in this way and the stock relish it better.

As to the adaptibility of the crop to poor soil, we have grown over sixteen bushels per acre on decidedly poor ground, ground that had received no manure in seventy-five years, where Corn produced probably twenty-five bushels, and clover was practically a failure.

Now, as to method of growing the crop, there are five essentials in securing maximum results with this crop. These are as follows: using the proper variety, which we score 30 per cent; stand, 25 per cent; inoculation, 10 per cent; cultivation, 15 per cent, and harvesting, 20 per cent.

Taking these points up in detail, in variety one can go very far astray, for there are several varieties of this plant, some of which will grow a foot high, such being very early sorts, others will grow six feet high, and are invariably quite late. Some are better crops for grain than for forage, and vice versa. Some varieties, as the Medium Early Green, shatter so badly

as to be extremely dangerous, others may stand in the field for at least a month after becoming fully matured, and still without shattering sufficiently to cause serious loss. Some varieties stand erect, others are more or less recumbent.

During the past fifteen years we have tested out practically every sort that showed any promise at all of being useful in the Corn Belt. The best of these varieties we have tested for three or four consecutive years before deciding whether they were good enough to retain or not. Many of them are so late as to be dangerous to undertake in the corn belt or anywhere north of the Ohio River. Many of them are reasonably good for hay or silage, but produce grain so sparingly as to be impracticable. The list of really useful sorts for the entire Corn Belt is not very large. First is the Ito San, an old standard sort that matures the earliest of any useful variety which we have ever tested. It is not as good as our later varieties, but it is the best of the very early ones. A week later comes the Jet, a black Bean, useful either for grain or forage, and early enough to do well in southern Michigan or any point south of there. With the Jet ripens the Mongol, a yellow Bean that seems to out-yield all others in the state of Missouri, and a splendid variety anywhere excepting in Ohio and Indiana. On poor ground the Mikado will usually excel it. The Mikado ripens a week later than the Mongol. In Indiana it seems to out-yield all other varieties. It is a yellow Bean, better for grain than forage, and it seldom fails in any state where it has sufficient time in which to mature. The Sable matures with the Mikado. This is a dual purpose Bean, the best variety that we have for poor soil; almost as good as the Wilson for forage, and better than the Wilson for grain. On rich soil it grows five feet tall, ordinarily, however, it grows about three and one-half feet. The Wilson matures with the Sable; in most states it is without a superior as a forage Bean, but in the Corn Belt it yields grain only moderately. In states east of Ohio it yields grain better than it does in Ohio and westward. This Bean usually grows four to five feet high, on several occasions I have had it six feet, and once, on very rich ground it grew eight feet. It usually lodges somewhat when it becomes taller than five feet. The Medium Green is a very early variety that we dislike because it shatters so badly. The Ebony, which is also called Black Beauty and Black Champion, is somewhat similar to the Sable, but not so good. The Early Brown or Brownie is similar to the Ito San, in no way superior to it, and we no longer grow it simply because the Ito San is better known and fully as good. The Ogemaw is an early Bean that we tested for a number of years to see if it were better than the Ito San; we found that it was not and discarded it. The Haberlandt is a splendid forage Bean that produces grain too sparingly to be practical. The same thing applies to the Meyer. The Morse and Nuttal we discarded because while they are in somewhat the same class as the Mikado they are not nearly equal to it. Ohio 9035

is a good Bean, in somewhat the same class as the Mikado, and in northern Ohio it does well; in sections south of the center it does not yield for us as well as the Sable.



A Field of Wing's Extra Select Sable Soys

The second consideration with Soy Beans is stand; and this we score 25 per cent. No plant is any more particular about its seed-bed than this one. The ground must be very thoroughly fitted; there must be few clods; the surface soil should be loose and level. The seed should be just barely covered; if covered deeply you can easily ruin the crop, because the plants even though they struggle through will be exhausted. We like them to be not more than one-half inch deep. For seeding purposes we rather prefer the Superior Grain Drill, made by The American Seeding-Machine Company, Springfield, Ohio. We sow in drills twenty-eight inches apart, and drop one seed about every one and one-half inches. A Corn Planter with Bean plates does the same thing reasonably well.

Of greatest importance is vitality of the seed. Soy Beans heat easily and may lose their viability in this way. Three-year-old seed will hardly grow at all, although two-year-old seed frequently germinates all right. It is wise to test your seed before planting in order to be sure that the germination is good.

The third point to insure a good crop is inoculation. Soy Beans seldom carry their own bacteria. If they do not find it in the soil they produce no nodules, and their nitrogen is gathered from the soil, a very expensive operation. A crop of Beans inoculated and cut for hay will draw from the soil about thirty pounds of nitrogen, if not inoculated it will draw from the soil one hundred to an hundred and twenty-five pounds. In the former case it uses only about one-half as much soil nitrogen as a sixty-five bushel corn crop; in the latter case it uses nearly double what

the corn crop would. Furthermore the crop itself will not be as good if there are no nodules, and even the analysis of the forage will show a smaller nitrogen content than it will when inoculation is present.

The fourth point necessary is proper cultivation; this we have scored 15 per cent. Proper cultivation of Soy Beans means three, four or five cultivations a season, shallow, level cultivations just as you would Corn. We use the Buckeye Pivot Beam Cultivator made by The American Seeding-Machine Company, Springfield, Ohio. We remove one shovel to each gang, and ordinarily space the other two somewhat differently each cultivation, the first time not undertaking to get as close to the plant as we do on subsequent cultivations. After blossoms appear, or even a little before this, you must absolutely stop cultivating.

Harvesting with the Soy Bean crop is one of the important items, but if you have been wise in the choice of your variety this point need not worry you so greatly. Our best varieties will stand in the field a month after becoming fully matured, and will not shatter a very heavy percentage even in that time. If the crop matures a little late, so that it is cool weather, we would place the shattering in a month's time at only 10 or 15 per cent. We begin harvesting after all the leaves have fallen, and when at least half of the pods have turned brown. It is safe to begin at this time. If one has large acreage, it is just as well to do so; if one has small acreage, he can harvest when the dew is on, and wait until all the pods are brown.

We use a self-rake to cut them with, dropping the plants off in good sized bunches. We work only when the dew is on in the morning. After they are cut we either let them cure in the bunches as dropped, or, if they get a little too dry and start to shell, we shock them. Sometimes we let them stand in shock ten days and then put them in the barn, or thoroughly protected ricks. Water will go right through one of these ricks unless properly protected. When possible, we prefer to thresh out of the shock. In threshing we use a Bean Thresher, but when this is not obtainable any common thresher with concaves removed, and run at very slow speed will crack only about one-fourth of the grain. If you wish them for seed be very careful that they do not heat. We know of no grain that we have ever tested out that heats as easily as Soy Beans do, and this must constantly be borne in mind no matter what you are doing with them. After threshing we let them set in sacks until absolutely dry before putting in a bin. They will not heat in bin after becoming properly dried out.

WHAT WE ARE DOING

We were rather forced into the seed business owing to our being the pioneer Alfalfa growers of the Corn Belt. We went into the business feeling that there was much work which could be done along the entire line of farm seeds, and we think we have accomplished a good deal of first-class work in this line. By use of extensive trial grounds, and still more extensive field tests on our different farms, we have solved most of the important problems connected with the growing of the great legume crops, as well as many of the other crops. Necessarily, while doing this, we have secured a great deal of information about the seed of these various crops, and we think that we not only know how to produce these crops, but where to secure the very highest quality of seed as well.

Our Field Seed Trial Grounds contain, this year, all of the important legumes as well as grain crops, and in it we are making several thousand tests. In other trial grounds we have test and breeding blocks for vegetables and flowers. We find these tests of fascinating interest, and believing that they might be of interest to others also we will be glad to show interested farmers anything that we have.

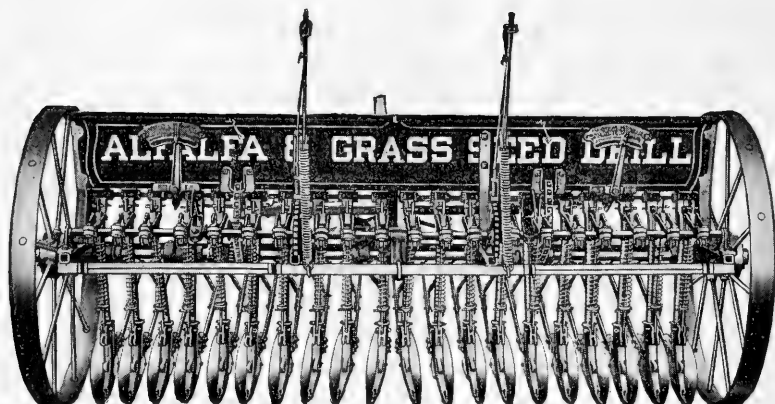
We have just purchased what we consider the most wonderful cleaner in the world. Will have it installed and operating about July 1st. This machine can almost see and talk. It will remove weeds which we could not take out with any other machine that has ever been marketed, and it will take out shrunken and light weight seed which it was impractical to remove before. Shrunken seed frequently germinates as freely as the plump seed does. It can hardly be expected, however, to produce as strong plants as the plump seed does. With this machine, we could, if desired, grade alfalfa seed that would weigh sixty-four or sixty-five pounds per measured bushel, and from that on down to fifty-five pounds. Necessarily if we take out shrunken seed which we have never been able to remove before, the seed will cost us more than it has ever done, and we will have to charge a higher price, but unquestionably the seed that has been handled by this machine will be more valuable and will produce larger, stronger plants than anything ever placed on market before.

Chas. B. Wing, General Manager.

THE WING SEED COMPANY,

Box B-4, Mechanicsburg, Ohio.

The SUPERIOR Alfalfa and Grass Seed Drill



The Superior Alfalfa and Grass Seed Drill has twenty discs spaced four inches apart. The discs are so constructed that the seed is protected from interference by wind or trash until it reaches the bottom of the trench. The seed is put in the ground, in a perfect furrow, where germination takes place in the shortest possible time. None of the seed is wasted, the rains do not wash the seeds in patches. The seed can be sown any day—wind or no wind.

This machine will save its cost in seed saved.

It has a positive force feed that will successfully sow Alfalfa, Clovers, Timothy, Blue Grass, Hemp, Millet, Flax, etc., in any quantity desired.

This machine will make its cost in the cultivation Winter Wheat, by increasing the yield, to say nothing of the Clover Seed that will be saved. This cultivating and clover seeding is accomplished by this machine in one operation.

The Superior Alfalfa and Grass Seed Drill will rejuvenate old pastures and meadows. It is a profitable implement to own.

Write the American Seeding-Machine Co., Springfield, Ohio, for their Superior Alfalfa and Grass Seed Drill Booklet. They will be pleased to answer any questions you may ask.

The BUCKEYE

Broadcast Lime and Fertilizer Sower



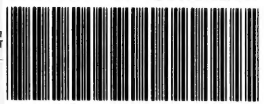
If your land is deficient in lime, you cannot grow Alfalfa or any other crop and get maximum or satisfactory yields.

The Buckeye Broadcast Lime and Fertilizer Sower is a very strong machine and is fitted with force feed. The Buckeye is very simple, easy to regulate and clean. It sets low to the ground and scatters very evenly.

The Buckeye will handle ground limestone, lime, basic slag, land plaster, nitrate of soda and any commercial fertilizer in almost unlimited quantities.

There are many excellent features on the Buckeye Broadcast Lime and Fertilizer Sower. By means of the throw-out device, the clutches can be locked apart, the hopper loaded and the machine transported without turning the feeding mechanism. The Levers shut off and also open the feeds. When once set the machine will sow the amount previously sown without again setting the quantity gauge.

Write the makers, The American Seeding-Machine Co., Springfield, Ohio, for their Buckeye Broadcast Lime and Fertilizer Sower Folder.

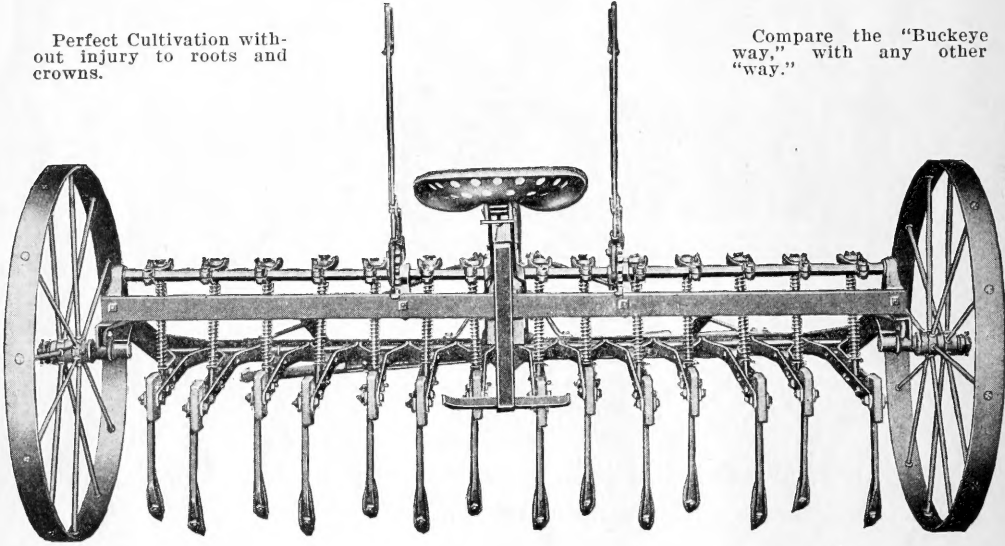


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The BUCKEYE Alfalfa Cultivator

Perfect Cultivation without injury to roots and crowns.

Compare the "Buckeye way," with any other "way."



This Cultivator is especially designed for the proper cultivation of Alfalfa, but is also an excellent implement for preparing any seed bed. As will be seen from the illustration the operator sits well behind his work and can see just exactly what is being done. The levers are within easy reach, and more or less pressure can be applied to suit the ground conditions. Also, should the cultivator "load up" with trash, or the hay left from cutting, the operator can immediately free the machine.

The important things in cultivating Alfalfa are: Thorough cultivation of the soil, without injury to crowns and roots and the eradication of weeds.

The Buckeye is so constructed that the teeth move from side to side and work around the roots and crowns.

When you injure an Alfalfa root or crown, decay sets in, the plant becomes sickly and finally dies.

Shun any method or tool in the cultivation of Alfalfa that splits crowns and roots.

The American Seeding-Machine Co., Springfield, Ohio, makes the Buckeye Alfalfa Cultivator and will be glad to furnish any further information.

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